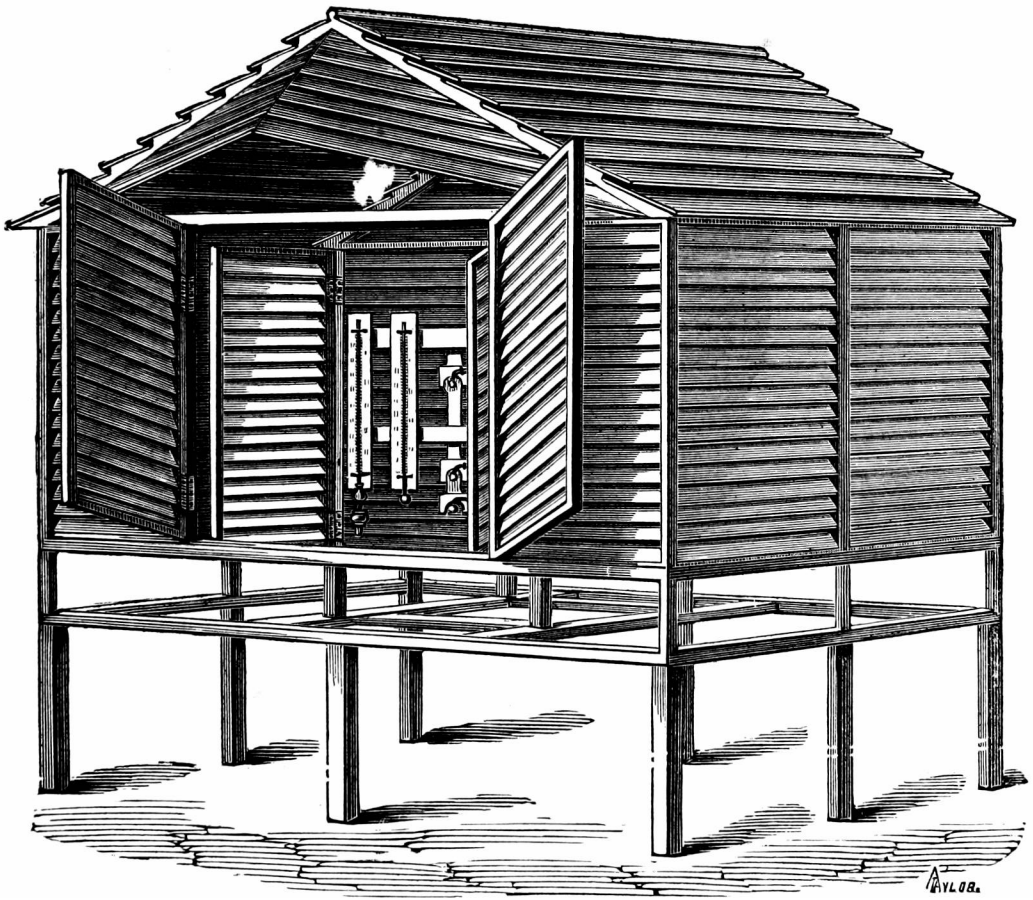


WELSH'S KEW THERMOMETER STAND.—(*See page* 18.)

# SYMONS'S

## MONTHLY

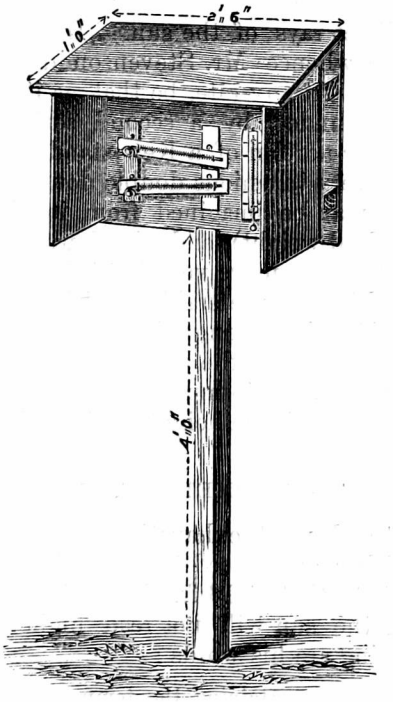
# METEOROLOGICAL MAGAZINE.

XXXVIII.] MARCH, 1869. [PRICE FOURPENCE or 5s. per ann. post free


## THERMOMETER STANDS.

As we are desirous of concluding our details of individual stands and modes of mounting, we proceed without further preface to describe

### PASTORELLI'S STAND.




A very simple arrangement, being virtually a Morris's stand with double back, and mounted on a post in lieu of being nailed to a wall. The accompanying engraving represents it so completely that little further explanation is necessary. It does not revolve, but is provided with wings, projecting six inches, and therefore cutting off the sun's

rays even at rising and setting in eleven months out of twelve. The layer of air between the two vertical boards is about two inches in thickness.

## KEW STAND.

This very important stand is last noticed, because last erected at Strathfield Turgiss. The fact was, the cost being reported to be about £12, we hesitated before spending as much over one stand as over any other three. The difficulty was most considerately removed by the Kew Committee of the British Association, who have kindly lent us the original Kew stand, which for so many years stood against the stone steps forming the northern entrance of Kew Observatory, and with the thermometers some 10 ft. above the surrounding ground. As will be seen from the frontispiece, and indeed as has already been stated in these pages, it is a very large, (6 ft. × 6 ft. × 5 ft.) nearly cubical, louvre boarded, double box, with louvre boarded folding doors to each box; the bottom, with the exception of the beams necessary to support the inner box, is quite open. It is not, therefore, easy to see how a more thorough exposure to air currents could be obtained, with perfect security from the direct rays of the sun. In a word, this stand may have been the type whence Mr. Stevenson designed his, which we engraved last month. At any rate, be that as it may, the Kew stand is a Stevenson surrounded by a second series of louvres, and a Stevenson is the inner portion of a Kew stand with several improvements—notably the very ingenious double louvres, the ventilator, &c. The Kew stand, as may be imagined from its size and cost, is very heavy (several hundred-weight), and the louvres of half inch wood, while those of the Stevenson are very light, like venetian blinds. We do not yet know which is preferable—thick or thin. In order to maintain perfect uniformity among all the stands, the Kew one is not now at the same height above the ground that it was at Kew, but, as represented in the engraving, so much of the posts is cut off as to bring the thermometers to the uniform height of 4 ft. above the turf.

## THERMOMETER AT 13 FT.

In one of the best and most exhaustive papers on meteorology ever written,* Mr. Glaisher announced the singular, and to some people incomprehensible fact, that at 13 ft. above the ground a thermometer in the full blaze of the sun will not read higher than one in perfect shade. The following are his words :—

"The thermometers for ascertaining the temperature of the air at distances from one inch to twelve feet from the earth, were placed with their stems passing through a piece of wood planted firmly in the ground, and whose thickness was two inches and breadth three inches, with the bulbs at least nine inches from the wood.

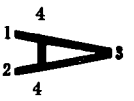
. . . . . .

* *Phil. Trans.*, 1847, pp. 124 and 142.

The several thermometers at the different distances from the earth, were for some time read at short intervals during the night and day, and it was found that, except after noon, the reading of the thermometer at 12 feet from the earth was very nearly identical with the true temperature of the air. The bulb of the thermometer thus exposed to the full rays of the sun was situated nine inches west of the plank which carried it, and whose width was three inches, and the cause of its readings being about 1° too high during the afternoon was owing to the heat reflected from the plank to it.

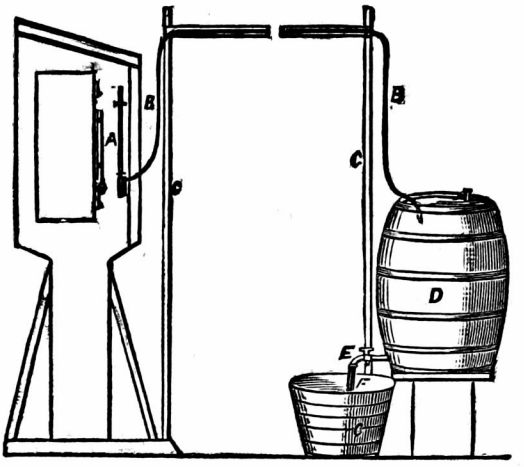
During the summer of 1844 and the year 1845, the readings of this thermometer were frequently examined, and found always thus to agree. Hence there is no doubt that if a thermometer be freely suspended in the air, with its bulb at the height of 13 feet above the soil and far from any object to reflect heat to it, its readings will represent the true temperature of the air at the time, and much more truly than those of any one placed near the ground or within a few feet of walls or buildings."

Herein, therefore, we seem to have that which some have thought so difficult of attainment, namely, a standard of true temperature in shade. We have consequently devoted some care to so mounting a thermometer that the supports should have no possible influence upon it. The arrangement adopted will be best shown in the general view of the thermometric enclosure which we intend to give in our next, but in the interim we may state that two posts, 14 ft. high, are placed 3 ft. apart on the north side of the enclosure, and one post of the same height, at the south side, there being 20 ft. between the two posts and the one post. To make the matter quite clear, let us take a very homely illustration—let 1 and 2 at the feet of the accompanying letter A represent the two northern posts; let 3 represent the southern one. Then




1 and 2 are coupled with cross bars for about 6 ft. above the ground, to afford means of reading the thermometer; but though 10 ft. distant, even these bars are not allowed any higher. From the top of post 1 a thin rope passes almost to post 3, but before reaching it is bent round and comes back to post 2; a similar rope passes from 1 ft. lower on post 1, and returns to a similarly lower position on post 2. The bends of these ropes unite near post 3, and one rope passes from this junction over a pulley on post 3, and then downwards, with a 7lb. sash weight attached, thus keeping the ropes constantly taut, and yet preventing alterations in their hygrometric condition from loosening the posts. Midway between the posts, say at 4, there is a bridge of iron wire, not so thick as a pencil, and from the middle of this the thermometer is suspended. It is therefore 10 ft. from everything but this frame and the cords, the total section of which is considerably under an inch, and none of which is within eleven inches of the bulb. From this description, especially when further elucidated by the engraving now in hand, we trust it will be evident that the mode of mounting fulfils as nearly as may be the requisite condition of free suspension, none of the tackling being of anything like the influence of the thermometer tube itself, with which of course we cannot dispense,

ASPIRATED THERMOMETER.




Everybody knows that it feels warmer when the thermometer shows 30° and the wind is calm, than if the temperature is much higher but a brisk wind is blowing; the reason being that the surface of the body being at (say) 60°, if the air is calm that in contact with the skin rises in temperature, and a partially warmed envelope surrounds the body. If however, the air is put in motion, and becomes wind, fresh layers of air are continually brought in contact with the skin, and its temperature is thereby reduced more nearly to that of the air. In the balloon ascents by Mr. Welsh in 1852, and in the recent ones by Mr. Glaisher, thermometers have always been employed, with a current of air drawn past them by a bellows-like apparatus worked by hand or foot. At Strathfield Turgiss our aspirator is self-acting, as shown by the annexed engraving, where (A) is a very delicate thermometer mounted in a shady corner of Lawson's stand; this thermometer has its bulb surrounded by a polished platinum tube which is open at the bottom, closed at the top round the stem of the thermometer, and with a small lateral tube, to which is attached a flexible tube (B), which is supported by (C), and led into the butt (D) through an air-tight joint. At the bottom of (D) is a tap (E), with a short length of tube (F) leading to the bottom of the tub (G) which is always partly filled with water. If (D) be assumed to be say half full of water, and the tap (E) be opened, water will pass from (D) into (G), but as this will create a partial vacuum in the upper portion of (D), a stream of air will therefore be drawn past the bulb of the thermometer, along the tube (B) as long as the water continues running out of (D) into (G). It would, therefore, seem that this thermometer is independent of wind; it certainly is well shaded, and it seems free from the objection indicated in Mr. Ryves' letter in our last, where he suggested that

some of the high readings at times recorded were "due to that accumulation of heat which must necessarily take place in and around any small structure of wood exposed to the full blaze of a powerful sun, even though the instruments themselves may be carefully shielded from its rays."

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## THE REMARKABLE STORM OF FEBRUARY 12TH, 1869.

HAVING understood that Mr. Glaisher, F.R.S., is likely to communicate the results of an examination of the above to the Meteorological Society at the meeting on March 17th, we think it will be most expedient to insert the following notes without comment, and in our next to report somewhat fully the paper to be read at the above-mentioned meeting.

*To the Editor of the Meteorological Magazine.*

SIR,—I have been surprised to find so little notice taken in the papers of a violent cyclone which passed over this part of England on the 12th inst. I have been collecting information from other parts of the country, and judging from the reports I have received, and from my own observations, I believe that the centre of the storm passed immediately over this county. At 7 a.m. on the 12th the wind was E. and light; rain was falling fast, as it had been during the last twelve hours; the thermometer stood then at 50°, but at 10 a.m. it had fallen to 41°. The wind then rose rapidly, blowing heavily from the S.E. at 11 a.m., and a gale from the S. at 1 p.m. The thermometer had now risen to 50°. At 3 p.m. it was nearly calm, the wind blowing lightly from the S.W.; the sun came out; the thermometer stood at 51°, and the weather looked like clearing up. At 4 p.m. the wind changed to N.W., with heavy rain; at 4.30 p.m. to N.; at 5 p.m. it was blowing a hurricane from N.N.E., with snow; the thermometer had now fallen to 33°; the change of temperature was so rapid that the windows were instantly covered with steam on the inside. By 7 p.m. the wind was moderate from the N.W.; the sky clear; thermometer 35°. The rainfall from 7 p.m. of 11th till 7 p.m. of 12th amounted to 1·25 in. The barometer at 9 a.m. on the 12th stood at 29·92; at 3.30, 29·49; at 10 p.m., 29·93.

I find that at Chelmsford the change to a violent N.E. wind, with snow, took place at 5.10. At Castle Hedingham, in Essex, at 4.45 p.m.; at the latter place 1·50 in. of rain fell during the storm. At Lowestoft, I see from the reports in the newspapers that a strong gale blew from the E. in the evening. I should imagine, therefore, this to be the northern limit of the storm. A friend, writing from the neighbourhood of Canterbury, gives the following account of the weather on the 12th: "The wind here blew fiercely all day, from S. to S.W., and at about 6.30 p.m. it veered suddenly to N.W., and blew a hurricane for half-an-hour, and then all was calm. . . . The rainfall was 0·82. . . . Our N.W. squall did all the damage here, snapping off a large elm in my

garden, tearing up by the roots a large cedar, and rooting up and snapping off an occasional oak, thorn and fir. The 'lie' of every tree told that the N.W. wind did the mischief." Canterbury was, therefore, probably not far from the southern limit of the cyclone.

I have been induced to give you rather a full account of this storm, for I felt that from its true cyclonic nature, it must possess many points of interest for meteorologists.—I am, Sir, yours faithfully,

W. CLINTON BAKER.

*Bayfordbury, Hertford, Feb. 27th*, 1869.

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WEYMOUTH.—*E. E. Glyde, Esq.*—Bar. at 9 a.m., 29·95; wind S.W., fresh and raining till 1 p.m., when bar. was only 29·55; tremendous gale from W. to N.W. from 2 to 4 p.m. on 12th; bar. at 6 p.m., 29·97; calm after 10 p.m.

ORLETON, TENBURY.—*T. H. Davis, Esq.*—Snowstorm noon to 3 p.m. on 12th; wind changed from W. to E., and then to S.

NORTHWICK HOUSE, HARROW—*H. St. John Joyner, Esq.*—Rain commenced about 4 p.m. on February 11th, continued all night, and at 9 a.m. on 12th I measured ·45 in.; at noon (that was during 3 hours) I measured again ·31 in.; it did rain in earnest for that time, wind shifting from W. to N E., S.E., S.S.W., to W. again in 24 hours, and at 4 p m it rose from that, with rain, hail, and sleet, into a most terrific hurricane, and blew most tremendously for nearly four hours; getting northward the sky cleared, stars were bright, and it froze. Barometer, which was 29 85 when the rain began, went down to 29·60 at noon, nad thenbegan rapidly rising: at 8 p m, 29·74, and this morning 29·97. Thermometer lowest in night, 28°; 32° at 8 a.m. Rainfall, ·42 in. at 9 a.m., which includes the ·31 measured at noon yesterday, so the fall during the 24 hours, from 4 p.m. on 11th, was ·87.

| | Time. | | Bar. | Ther. | Wind. |
|---|---|---|---|---|---|
| 11th | ... 8 ... | Fair, dry, fine ..... | 29·80 ... | 51° ... | W. |
| ,, | ... 12 ... | Fine ..... | ... ... | 52° .. | ... |
| ,, | ... 5 ... | Clouds, rain..... | 29·85 ... | 48° ... | W. |
| Night | ..... | Rain ..... ... | ... ... | 40° .. | ... |
| | | Rainfall, 0·45. | | | |
| 12th | ... 8 ... | Thoroughly wet ..... | 29·83 ... | 40° .. | N.E. |
| ,, | ... 10 ... | Much rain ..... | ... ... | ... ... | S.E. |
| ,, | ... 12 ... | Rain ..... ..... | 29·60 ... | 48° ... | S.S.W. |
| ,, | ... 5 ... | Hurricane, hail ..... | ... ... | 37° ... | W. |
| ,, | ... 8 ... | Calm, clear ..... ... | 29·74 ... | ... ... | N.W. |
| Night | ..... | Frosty ..... | ... ... | 28° ... | N. |
| | | Rainfall, 0·42. | | | |
| 13th | .. 8 ... | White frost, clear ... | ... ... | 32° ... | N.W. |

WESTMINSTER.—*H. S. Eaton, Esq., M.A., F.M.S.*—

| | Bar. red. to sea level. in. | Dry Bulb Ther. | Rate of Bar. change per hour. | Remarks. |
|---|---|---|---|---|
| 10 a.m.... | 29·857 ... | — ... | — ... | |
| 4.30 p.m. | 29·341 ... | 49° ... | ·080 ... | |
| 4.35 ,, | — ... | — ... | — .. | Wind changed from S.W. to N.N.W. |
| 5.0 ,, | 29·466 ... | 37° ... | ·250 ... | |
| 5.15 ,, | ·557 ... | — ... | ·364 ... | |
| 5.30 ,, | 29·617 ... | — ... | ·240 ... | Rise in 1 hour = ·276. |

CAMDEN SQUARE.—*G. J. Symons, Esq., F.M.S.*—At 9 a.m. the bar. read 29·880, and was falling rather rapidly; wind N.E.; towards noon the bar. fell faster, the wind became S.W., and so continued, with a continuous and very rapid fall of the barometer, and rise of temperature to 50°, until 4.40, when all at once the wind veered to N.E., and blew with great force; the barometer ran up, the thermometer went down almost to freezing point, every window in the house was streaming with moisture condensed on the inside of the glass by the external cold, the rain ceased, and the evening was cold and almost frosty. The following are the readings of the barometer reduced to sea level:—9 a.m., 29·880; 0.30 p.m., 29·672; 3.5 p.m., 29·427; 3.25 p m., 29·390; 3.30 p.m., 29·372; 4·15 p.m., 29·318, after which it rose rapidly, and was 29·915 at 9 p.m.—the most rapid fall was therefore at the rate of ·216 in. per hour, and the lowest point was reached nearly half-an-hour before the sudden increase of wind force.

BECKENHAM, PARKSIDE.—*C. O. F. Cator, Esq., M.A., F.M.S.*—February 11th, 9 p.m., after 113 hours continuous blow became calm; February 12th, 6 a.m., by this time had backed to E.N.E., and remained till 10 a.m. E.N.E., and became by forward motion at 10.45 a.m. S.S.W., up to which time it remained calm. 11 a.m., began to blow; 2.20 p.m., 10 lbs. on square foot; 4 p.m. to 4.40 p.m., only 3 lbs. to 5 lbs., and during these 40 minutes changed from S.W. to W.; at 4.40 the sudden shift began, and also increase of strength; 4.45, 9lbs.; 4.50, 11½ lbs.; 4.55, 13 lbs. N.W.; 5 p.m., 17·6 lbs., max. gust, N.W.; 5.10, 14 lbs. N.W.; 5.30, 8 lbs. to 10 lbs. N.W.; 6.10, 16 lbs. N.W.; 6.40, 11 lbs. N.W.; 9, 1 lb. N.W.; 11, W.S.W.; by midnight became calm.

TUNBRIDGE WELLS.—*Rev. F. W. Stow, M.A., F.M.S.*—Wind veered to N.W. at 5.25, and at 5.30 burst in the window; bar. at 5 p.m., 29·060, at 6 p.m. 29·246; rise in one hour, ·186.

HIGH RODING RECTORY, DUNMOW, ESSEX.—*Rev. Edward Maxwell.* I observed, soon after 7 a.m. the 12th, that the wind had changed during the night from S.W. to N.E. It was raining, and had been doing so, I believe, most of the night. The quantity measured at 9 a.m. was 0·49 in. The rain continued; the wind was gentle, but gradually shifted to S.E., then to S. about the middle of the day, when it also began to blow stronger. The barometer fell between 9 a.m. and 12.30 (noon) from 29·83 in. to 29·30 in., or more than half-an-inch in 3½ hours. But by 10 p.m. it had risen again to 29·80.

About 4 p.m. I thought the sky betokened a cessation of the rain, and I started for a walk, hoping to see the flood in the river Roding, but I could not get beyond the shelter of my own shrubbery. The air was then mild, about 47° or 48°, and the wind from the S.W. Soon after this the wind shifted to the W. and N.W., rising considerably, and between 5 and 6 blew from the N. a furious gale, bringing down with it first hail, or rather small flat pieces of ice, followed by snow for a short time.

The external thermometer fell to 33°, or 15° in about an hour's

time. The wind continued high for some time afterwards from the N. By the next morning it had fallen considerably, and gone back to S.W. On the morning of the 13th I measured rain to the depth of 0·66 in., making, with the previous 0·49, a total in two days of 1·15 inches. There has not been such a flood as that of Friday evening for some years.

The peculiarities of the above are of course the shifting of the wind almost round the compass from N.E. by S. to N. in the space of (say) 9 hours, and the rapid fall of the temperature.—Yours truly,

CAMBRIDGE, BEECH HOUSE.—*J. Nutter, Esq.*—Very heavy rain here on 12th, amounting to 1·39 in., and at Granchester Mill to 1·47 in.

CAMBRIDGE, MERTON VILLA.—*G. Warren, Esq.*—February 11th, 8·30 p.m, steady rain began, light wind from S. February 12th, 9 a.m, incessant heavy rain, wind light from E., rainfall, 0 29 in.; 9 a.m. to 4 p.m., heavy rain; 4 to 7 p.m., snow storm, with violent squalls from N.; total rainfall in 22 hours, 1·62 inches. Barometer, corrected and reduced: 9 a.m., 29·94 in.; 5 p.m., 29 54; 10.30 p.m, 29·89.

PICKENHAM HALL, NORFOLK.—*E. A Applehwaite, Esq.*—On 12th, at 8.30 a.m., bar. was 30 inches, at 5 p m., it was down to 29·20, rain fell all the morning from the N.E., and at 2 p.m. snow in enormous quantities, the flakes as large as crown pieces, and blowing very hard. The ther. fell to 33° at 3 p.m., and at 7 p.m. rose to 36°, the wind having dropped and a gentle rain recommenced; the total fall was 1 26 in. On 13th, hot sun melted all the snow, and caused considerable floods.

BOYLAND HALL, LONG STRATTON, NORFOLK.—*F. Irby, Esq.*—Wind S.S.W. in the morning, with rain; from 1 to 4 p.m. an aneroid bar. fell 0·25; it then became stationary till about 6 p.m, after which it rose rapidly; a very heavy gale, with snow and hail, blew from 4 till 7 p.m. A large elm tree went down about 5 p.m., but it blew hardest from N.N.E. at 5.45 p.m.

GELDESTON, BECCLES.—*E. T. Dowson, Esq.*— Aneroid at 9 a.m. 12th, 30·04; at 4.15 p m., 29·51; at 9 p.m., 29.86; at 10 p.m., 29·93. Rain from 5 a m. continuing all day, with sleet in the afternoon and an easterly gale in the evening. Rain from 9 a.m. 12th, to 9 a.m. 13th, 1·05 in.

## PERIODIC SNOW BALLS ON MARCH 8TH.

WE have so often referred to the above subject in these pages* that we shall dismiss it with a very few lines. From Strathfield Turgiss Mr. Griffith writes:—"Hail balls fell here from 8.30 to 8.35 a.m." From Winchmore Hill Mr. Paulin writes:—"A rather heavy fall of the periodical soft hail or snow balls occurred here this morning (8th); it commenced at 7.45, and continued till 9 a.m., when it changed to

* Vol. I., p. 17; Vol. II, p. 30; Vol. III., p. 48.

snow crystals, and snowed very heavily till 9.30." At Camden Square snow fell up to 8 a.m.; at 8.20 there was a smart shower of very small balls, larger than sleet, but not to be compared with the remarkable ones of 1857. After 8.45 the fall was large snow flakes, and many very fine crystals.

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## FINE SHOWER OF SNOW-CRYSTALS ON MARCH 10TH.

"Yesterday morning (March 10th) a remarkably fine fall of snow-stars took place over many parts of London. The crystals were larger and more perfectly formed than is generally the case in our latitudes, where the conditions requisite for the formation of these beautiful objects are less perfectly fulfilled than in more northerly regions. Many forms were to be noticed which the researches of Scoresby, Glaisher, and Lowe have shown to be somewhat uncommon.

"Many of our readers will perhaps be surprised to learn that no less than 1,000 different kinds of snow-crystals have been noticed by the observers named above, and that a large proportion of them have been figured and described. The patterns are of wonderful beauty. A strange circumstance connected with these objects is the fact that for the most part they are found, on a close examination, to be formed of minute coloured crystals—some red, some green, others blue, or purple.* In fact all the colours of the rainbow are to be seen in the delicate tracery of these fine hexagonal stars. So that in the perfect whiteness of the driven snow we have an illustration of the well-known fact that the colours of the rainbow combine to form the purest white, for the common snow-flake is formed of a large number of such tiny crystals as were falling yesterday, though their beauty is destroyed in the snow-flakes through the effects of collision and partial melting. It may not be very commonly known that ordinary ice, also, is composed of a combination of crystals, presenting all the regularity of formation seen in the snow-crystals. This would scarcely be believed by anyone who examined a rough mass of ice taken from the surface of a frozen lake, yet, if a slice be cut from the mass and placed in the sun's light, or before a fire, the beautiful phenomena called ice-flowers make their appearance—'A fairy seems to have breathed upon the ice, and caused transparent flowers of exquisite beauty suddenly to blossom in myriads within the ice.'

"When we remember that the enormous ice-bergs of the Arctic and Antarctic seas, the snow-caps which crown the Alps, and Andes, and Himalayas, and the glaciers which urge their way with resistless force down the mountain valleys, are all made up of these delicate and beautiful snow-flowers, we are struck with the force of the strange contrasts which nature presents to our contemplation. We may say of the snow-crystals what Tennyson said of the small sea-shell. Each snow-star is

'Frail, but a work divine,
Made so fairily well,
So exquisitely minute,
A miracle of design.'

Yet massed together with all the prodigality of nature's unsparing hand they crown the everlasting hills; or, falling in avalanche and glacier, overwhelm the stoutest works of man, or in vast islands of floating ice show themselves to be

'Of force to withstand, year upon year, the shock
Of cataract seas that snap the three-deckers oaken spine.'"

—*Daily News.*

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* Of course these colours are not real, simply the effect of refraction in these fairy prisms.—ED.

## MAGNETIC VARIATION.

[ONE great advantage of a small periodical like this is, that circulating almost exclusively among those conversant with the topics of which it treats, any erroneous statement is almost sure of prompt detection and correction. Long may it be so. Correspondents, reviewers, readers, and editor are all benefitted by the most rigorous criticism, and most heartily do we detest the absurd dogma of editorial infallibility. An instance illustrating this promptitude has just occurred. On Dec. 24th, 1868, Mr. Mitchell asked us to give the present magnetic declination. In our January issue we did so, basing our calculations on General Sabine's Magnetic Survey, and stating that—"We believe no data of the kind have been collected or published by the Greenwich authorities, whose observations are exclusively made at the Royal Observatory." Immediately after the publication of that number, we were favoured by Mr. Davis, of Derby, with the paper which we print *in extenso*. Of course if we had been previously aware of its publication, we should have referred to it, but in justification of what we did say, it is only fair to remark, that the paper is apparently not an official one, but simply a communication from the Astronomer Royal to some periodical. It is satisfactory to find that, with the exception of the line for 23° (which Mr. Airy puts to the west of ours), the positions of the several lines as given last month, and those deducible from Mr. Airy's paper are almost identical.—ED.]

VARIATION OF MAGNETIC NEEDLE AT GREENWICH.

| | | | |
|---|---|---|---|
| 1863.—January, | West declination | - - - | 20° 50′ |
| „ July, | „ „ | - - - | 20° 47′ |
| 1864.—Interrupted. | | | |
| 1865.—February | „ „ | - - - | 20° 31′ |
| „ July | „ „ | - - - | 20° 31′ |
| „ December | „ „ | - - - | 20° 33′ |
| 1866.—July | „ „ | - - - | 20° 26′ |
| „ December | „ „ | - - - | 20° 22′ |

(I give them to the nearest minute.)

Generally, it may be understood that the western declination is now diminishing at the rate of 1° in 8 years.

A magnetic survey of an entire kingdom is an operation so troublesome that it is impossible that it can be made very frequently, and we are in practice compelled to adapt the results of a survey made in one year to form, by application of a constant difference, results equivalent to those which would be obtained by survey in another year.

From Dungeness to North Foreland, magnetic westerly declination is 40′ *less* than at Greenwich.

From Shanklin (Isle of Wight) to the middle of the Wash, 20′ *more* than at Greenwich.

From the Start Point, by Bristol, to Whitby, 1° 20′ *more*.

From the Land's End, by Liverpool, to Holy Isle, 2° 20′ *more*.

From Douglas (Isle of Man), by Kirkcudbright, to Leith, 3° 20′ *more.*

From Youghal (Ireland), by Newry, Belfast, and Bute, to Inverness, 4° 20′ *more.*

From Tralee, by Galway and Londonderry, to Cape Wrath, 5° 20′ *more.*

From Achil Head to the western part of the Lewis, 6° 20′ *more.*

If these differences are applied to the declination at Greenwich, the declination on each of those lines will be obtained with great accuracy. And with the assistance of a map, any of your correspondents will be able to find the declination for his own locality.

(Signed,) G. B. AIRY.

*Royal Observatory, Greenwich,*
*London, S.E., September 19th,* 1868.

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## RAINFALL AT MALTA.

*Comparative Statement of the Rainfall during the last Six years, according to Indications of the Pluviometer on the Terrace of the Public Library.*

| | 1863 | 1864 | 1865 | 1866 | 1867 | 1868 |
|---|---|---|---|---|---|---|
| | in. | in. | in. | in. | in. | in. |
| January | 1·04 | 6·29 | 1·48 | 0·55 | 0·56 | 3·08 |
| February | 3·00 | 2·15 | 1·73 | 2·02 | 0·09 | 0·48 |
| March | 3·76 | 0·14 | 0·05 | 0·45 | 0·72 | 5·83 |
| April | 1·90 | 0·65 | 0·00 | 0·02 | 0·29 | 2·04 |
| May | 0·13 | 0·38 | 0·00 | 0·04* | 0·00 | 0·07 |
| June | 0·00 | 0·00 | 0·03 | 0·10 | 0·00 | 0·28 |
| July | 0·00 | 0·00 | 0·00 | 0·00 | 0·00 | 0·00 |
| August | 0·00 | 0·00 | 0·00 | 0·00 | 1·08 | 0·00 |
| September | 1·34 | 0·38 | 3·58 | 0·00 | 1·30 | 0·44 |
| October | 2·70 | 3·99 | 1·99 | 3·20 | 1·01 | 5·17 |
| November | 5·18 | 2·77 | 2·48 | 2·23 | 3·03 | 4·40 |
| December | 5·96 | 3·93 | 4·62 | 0·39 | 3·16 | 1·57 |
| | 25·00 | 20·68 | 15·96 | 9·36 | 11·24 | 23·36 |

The mean annual fall has therefore been 17·60 in.—*Malta Times.*

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* This should probably be 0·40 in. ; if not, the total is 9·00.—Ed.

# FEBRUARY, 1869.

| Div. | | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. Total Fall. | Difference from average 1860–5 | Greatest Fall in 24 hours. Dpth | Greatest Fall in 24 hours. Date. | Days on which ·01 or more fell. | TEMPERATURE. Max. Deg. | Max. Date. | Min. Deg. | Min. Date. | No. of nights below 32° on grass |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | inches | inches. | in. | | | | | | | |
| I. | ENGLAND. | Camden Town | 2·48 | + 1·26 | ·52 | 11 | 17 | 60·8 | 5 | 31·3 | 24 | 4 |
| II. | | Staplehurst (Linton Park) | 3·15 | + 1·64 | ·75 | 12 | 14 | 56·0 | 6 | 28·0 | 24 | 6 |
| ,, | | Selborne (The Wakes) | 3·33 | + 1·62 | ·74 | 11 | 18 | 51·0 | 17* | 29·5 | 24 | 8 |
| III. | | Hitchen | 2·02 | + ·76 | ·93 | 12 | 14 | 56·0 | 4, 5 | 32·0 | 19§ | ... |
| ,, | | Banbury | 2·20 | + ·77 | ·75 | 12 | 16 | 56·0 | 5 | 28·0 | 24 | 5 |
| IV. | | Bury St. Edmunds (Culford) | 2·49 | + 1·07 | 1·11 | 12 | 12 | 56·0 | 4† | 25·0 | 19‖ | 7 |
| V. | | Bridport | 3·07 | + 1·01 | ·74 | 11 | 17 | 57·5 | 3 | 27·5 | 23 | 4 |
| ,, | | Barnstaple | 4·35 | + 2·27 | ·77 | 12 | 21 | 62·0 | 6, 7 | 34·0 | 20 | ... |
| ,, | | Bodmin | 4·56 | + 1·77 | ·92 | 11 | 22 | 58·0 | 5 | 34·0 | 19‡ | ... |
| VI. | | Cirencester | 3·37 | + 1·76 | 1·35 | 12 | 13 | 53·0 | 8 | 36·0 | 20 | ... |
| ,, | | Shifnall (Haughton Hall) | 2·00 | + 1·11 | ·50 | 12 | 17 | 55·0 | 8 | 27·0 | 23 | 4 |
| ,, | | Tenbury (Orleton) | 2·91 | + 1·34 | ·75 | 12 | 19 | 59·8 | 5 | 27·0 | 23 | 4 |
| VII. | | Leicester (Wigston) | 1·91 | + ·57 | ·92 | 12 | 10 | 57·0 | 5 | 29·0 | 12¶ | 4 |
| ,, | | Boston | 1·89 | + ·68 | ·71 | 12 | 16 | 58·5 | 8 | 32·0 | 23 | ... |
| ,, | | Killingholme (Lincoln) | 1·56 | .. | ·31 | 2 | 13 | 56·0 | 8 | 32·0 | 13** | ... |
| ,, | | Derby | 1·89 | + ·41 | ·35 | 12 | 19 | 57·0 | 5, 8 | 30 0 | 20 | 2 |
| VIII. | | Manchester | 4·44 | + 2·49 | ·73 | 8 | 21 | 61·8 | 5 | 32·0 | 18 | ... |
| IX. | | York | 1·72 | + ·34 | ·28 | 24 | 16 | 58·0 | 10 | 31·0 | 13** | 2 |
| ,, | | Skipton (Arncliffe) | 9·08 | + 5·41 | 2·14 | 8 | 20 | 54·0 | 6 | 30·0 | 28 | 1 |
| X. | | North Shields | 1·32 | — ·21 | ·47 | 10 | 12 | 59·0 | 5 | 30·0 | 28 | 1 |
| ,, | | Borrowdale (Seathwaite) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| XI. | WALES. | Cardiff (Town Hall) | 4·80 | ... | ·93 | 12 | 21 | ... | ... | ... | ... | ... |
| ,, | | Haverfordwest | 6·11 | + 3·25 | 1·08 | 11 | 17 | 54·0 | 6 | 30·0 | 21 | 2 |
| ,, | | Rhayader (Cefnfaes) | 5·49 | + 2·51 | ·90 | 16 | 20 | 59·0 | 13 | 30·0 | 22 | .. |
| ,, | | Llandudno | 3·43 | + 2·08 | ·87 | 7 | 19 | 58·0 | 4 | 34·0 | 28 | ... |
| XII. | SCOTLAND. | Dumfries | 4·45 | + 1·90 | ·67 | 8 | 21 | 55·0 | 5 | 30·5 | 28 | 1 |
| ,, | | Hawick (Silverbut Hall) | 3·54 | ... | ·83 | 7 | 25 | ... | ... | ... | ... | ... |
| XIV. | | Ayr (Auchendrane House) | 5·48 | + 2·12 | ·70 | 24 | 25 | 57·0 | 5 | 30·0 | 28 | 4 |
| XV. | | Castle Toward | 5·66 | + 1·92 | ·59 | 7 | 24 | 54·0 | 4 | 25·0 | 27 | 10 |
| XVI. | | Leven (Nookton) | 2·46 | + ·76 | ·54 | 13 | 16 | 57·0 | 5 | 29·0 | 28 | 4 |
| ,, | | Stirling (Deanston) | 5·87 | + 2·87 | ·94 | 13 | 26 | 56·5 | 5 | 26·1 | 28 | 8 |
| ,, | | Logierait | 3·38 | ... | ·64 | 13 | 17 | ... | ... | ... | ... | .. |
| XVII. | | Ballater | 1·82 | ... | ·36 | 8 | 13 | 55·5 | 5 | 27·0 | 3, 28 | 8 |
| ,, | | Aberdeen | 1·27 | ... | ·46 | 8 | 18 | 57·6 | 5 | 28·5 | 28 | 7 |
| XVIII | | Inverness (Culloden) | 2·76 | ... | ·45 | 15** | 17 | 54·4 | 5 | 28·7 | 28 | 2 |
| ,, | | Fort William | 12·22 | ... | 1·38 | 13 | 28 | ... | ... | ... | ... | ... |
| ,, | | Portree | 11·40 | + 1·17 | 1·25 | 13 | 24 | ... | ... | ... | .. | ... |
| ,, | | Loch Broom | 6·89 | ... | 1·25 | 14 | 22 | ... | ... | ... | ... | ... |
| XIX. | | Helmsdale | 4·90 | ... | ·66 | 26 | 21 | ... | ... | ... | ... | ... |
| ,, | | Sandwick | 4·04 | + 1·56 | ·53 | 3 | 22 | 51·0 | 6 | 28·4 | 28 | 4 |
| XX. | IRELAND. | Cork | 2·96 | ... | ·83 | 7 | 17 | ... | ... | ... | ... | ... |
| ,, | | Waterford | 2·34 | + ·31 | ·69 | 7 | 21 | 54·0 | 3, 25 | 32·0 | 28 | ... |
| ,, | | Killaloe | 5·96 | + 3·05 | 1·40 | 7 | 28 | 57·0 | 14 | 32·0 | 18 | ... |
| XXI. | | Portarlington | 2·24 | + ·21 | ·44 | 8 | 22 | 56·0 | 5 | 33·0 | 28 | ... |
| ,, | | Monkstown | 1·50 | — ·14 | ·26 | 7 | 16 | 61·0 | 5 | 31·0 | 28 | 1 |
| XXII. | | Galway | 6·12 | ... | 1·25 | 7 | 26 | 56·0 | 23 | 32·0 | 1 | ... |
| ,, | | Bunninadden (Doo Castle) | 5·21 | ... | 1·08 | 9 | 25 | 54·0 | 5 | 29·0 | 2 | 1 |
| XXIII | | Bawnboy (Owendoon) | 6·50 | ... | 1·29 | 7 | 24 | 56·0 | 5 | 29·0 | 1 | 2 |
| ,, | | Waringstown | 4·30 | ... | ·65 | 9 | 22 | 57·0 | 4 | 29·0 | 27 | 2 |
| ,, | | Strabane (Leckpatrick) | 4·22 | .. | ·73 | 9 | 24 | 55·0 | 5, 6 | 27·0 | 28 | 5 |

* And 27th. † And 5th, 6th & 8th. § And 20th. ‖ And 23rd. ‡ And 22nd.
¶ And 19th & 23rd. ** And 28th.

+ Shows that the fall was above the average; — that it was below it.

# METEOROLOGICAL NOTES ON THE MONTH.

ABBREVIATIONS.—Bar for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

## ENGLAND.

CAMDEN TOWN.—Gales on 8th, 9th, 11th, and 28th; S on 22nd and 28th; almond in flower on 13th, pear in bud on 24th.

LINTON PARK.—A very mild month; vegetation forward; winds mostly S.W. and W.; very slight frosts, but a heavy fall of S on the 22nd, which soon melted; bar. very unsteady, sometimes fluctuating nearly an inch in 24 hours; R much above the average. Although it has been a wet month, dust was flying about on the 28th, an unusual thing for February.

SELBORNE.—Violent wind, with H and storm of R, at noon on 9th; the min. temp., 29·5 on 24th, had risen to 41° at 8 a.m. on 25th, with change of wind from N.E. to S.W., and back to N.E. in evening. Vegetation about six weeks earlier than the average; yew and box in flower early in the month.

BANBURY.—S on 12th and 22nd; high winds on 6th, 7th, 8th, 9th, 16th, and 27th; violets in bloom on 20th.

CULFORD.—Stormy on 1st and 2nd, high wind on 7th and 8th, a little S on 12th, which soon changed to R, which continued all day; a considerable amount of S fell on the last day of the month which soon melted; altogether this was the most winterly day we have had this winter.

BRIDPORT.—Heavy south-westerly gale with very high tide on the 1st. A mild month, and vegetation very forward.

BODMIN.—Mean temp. of the month 4°·6 above the average of 20 years.

CIRENCESTER.—Double the usual quantity of R this month, with much wind and several gales; S from 2.30 to 3.30 p.m. on 13th, and S shower on 28th. Many spring flowers and much grass; not one hoar frost.

HAUGHTON HALL, SHIFFNAL.—Another wet and windy month, with high temp. Nettles several inches high on the 5th; willow blossoming, apricots in flower and hawthorn budding on the 16th; wild daffodil in flower on 20th; rooks began to build on 28th; the lower grounds flooded all the earlier part of the month; pastures green as in May; stormy on 7th, 14th, 27th and 28th.

ORLETON.—5th and 6th very fine and pleasant, but high winds on 7th and 8th; S storm at noon on 12th, and again on 28th from 11 a.m. to noon; high winds on 13th, 14th and 27th; the rivers frequently full. A warm rainy month with changeable sky; the temp. more than 5° above the average; vegetation very forward; apricots in bloom on the 12th. T S in S.E. on 18th.

WIGSTON.—Mean temp. 5° higher than the mean of same month for 15 years; rainfall also in excess. Apricot trees in full bloom in the middle of the month, and vegetation more forward than I have ever recorded.

BOSTON.—Temp. very high during first part of the month; vegetation very prematurely advanced, limes, elms, and other forest trees being in full bud; gnats flying on the 10th. Rainfall above the average, but not excessive.

KILLINGHOLME.—Much high wind during the month; vegetation earlier than I ever knew it, even in 1859; scarcely any E. wind; great titmouse and thrush singing on 4th; several bats out in the evening of 6th; ringdove cooing, and blackbird whistling on 12th; frogs spawning on the 23rd; crocus and hepatica began to flower on 4th, wild primroses on 6th; pyrus japonica in flower, and yews shedding pollen on 10th; gossamer across rain gauge on 11th; elms flowering, bees busy at the blossom, on 15th; apricots began to flower; queen wasp out on 16th; hawthorn buds green on 19th; peach began flowering on 20th; had lawn mown on 24th; sleet on 28th, which was the coldest day in the month.

DERBY.—The temp. of the month was 5°·2 above the average of the last seven years; vegetation is considered to be six weeks in advance of the average, and fears are entertained as to the result. Snowstorm on 28th.

NORTH SHIELDS.—Yellow and purple crocus in flower in the first week. S on 2nd, 23rd, 27th and 28th. Lunar halo on 24th.

## WALES.

HAVERFORDWEST.—A mild month, generally stormy and wet, the wettest February during the last 20 years; only two nights frost; spring flowers in full blossom; the Precelly hills white with S on the morning of the 28th; heavy gale from the N.W. on 27th and 28th.

CEFNFAES.—A stormy, tempestuous month; winds strong and frequent, generally N.W. or S.E.; vegetation forward, and all spring flowers both fine and abundant.

LLANDUDNO.—S on the distant hills on 12th, 18th, 23rd, and 27th; severe H storm at 3.15 p.m. on 24th; lunar rainbow at 9.30 p.m. on 26th. Peach, apricot, and pear in bloom on 4th; sprig of hawthorn in full leaf on 6th; blackthorn, palm and primroses in bloom in the lanes on the 13th; red flowering currant in full bloom on 16th; mezereon in flower on 20th; horse chesnut and elder in full leaf in sheltered situations on 21st.

## SCOTLAND.

DUMFRIES.—Month wet but mild; vegetation unusually forward; fruit trees expanding their blossoms; the gloire de Dijon rose with large buds; pastures very green and beautiful. On the night of the 27th a S storm, and on the morning of the 28th the S was from 3 to 4 inches deep over the country, but deeper on the hills.

SILVERBUT HALL.—Heavy gales on 1st, 5th, 6th, 7th, 13th, 16th, and 17th. hurricane from W. on 4th; tremendous wind on 25th; keen frost on 27th and 28th, which checked the growth of grass, disfigured bays, laurels, &c., and injured the prematurely developed buds of trees and shrubs. S about three inches deep at the end of the month.

CASTLE TOWARD.—A mild, dull, cloudy month, until the last few days, when it was cold and stormy, with S, sleet, and heavy H showers; a yucca gloriosa began to throw up a flower shoot about the 1st, and is now 15 inches long, having grown half an inch every day since; I never saw it start so early before.

NOOKTON.—Gales on 5th, 7th, 13th, and 25th; S on 27th and 28th.

DEANSTON.—Very wet month; gales on 6th, 13th, 14th, 26th, and 27th, the latter accompanied by heavy falls of S.

LOGIERAIT.—Frequent gales of wind with R, but no frost till the 28th, when much S fell, the first of the season.

BALLATER.—Up to the last week vegetation was making alarming progress for the season; the last week, however, was stormy, with strong gales of wind, and the ground covered with S, which remained to the end of the month. Pink hepatica in flower on the 4th, blue hepatica and crocus on the 20th. Lark singing on 16th. Aurora on 9th; lunar halo on 19th and 23rd.

ABERDEEN.—A month of fine, mild, dry weather, except the last four days, which were stormy; S on the last three; S.W. and W. winds more than usually prevalent. Temp. 4°·6 higher than the average of last 12 years, and bar. lower. Auroræ on 1st, 3rd, 4th, 9th, 10th, 11th, 14th, 16th and 17th.

ROSSE PARSONAGE.—R has been registered every day, but in smaller quantities than last February, when the total was 20·13, this year it is but 12·22; we have had 8 in. of S; no frosts, but very stormy on 13th, 25th and 26th.

PORTREE.—This month has been very stormy and squally throughout; a continuous W.S.W. gale from 9·30 a.m. on the 25th to 3 a.m. on 1st March. A heavy fall of S commenced on the evening of the 26th, and continued to the 1st of March, being blown in some places 18 inches deep; on each of three days more than 1 in. of R was measured.

LOCHBROOM.—Upon the whole, this has been a beautiful and favorable month for the agriculturist and grazier; trees and bushes never seemed so green and so far advanced at this season, but a sudden change took place by the end of the month: on the night of the 26th and morning of 27th we had one of the most terrific storms from the S.W. that we ever remember, doing great damage to ships, houses, and other exposed property.

SANDWICK.—February has been wetter and warmer than the average, but very

stormy, especially the latter half; there were six gales, and the last of these, on the 27th, was fully equal to any yet recorded here since the anemometer was erected (8 years ago), being 75 miles an hour from 3 to 5 a m.; a continued gale travelling 1276 miles between 10 a.m. on 25th and 10 a.m. on 26th. Auroræ on 2nd, 4th, 6th, 9th, 10th, 11th, 12th, 17th, and 27th.

### IRELAND.

WATERFORD.—The rainfall of the *six* months ending February 1st was 40 in., being almost exactly the average fall in *twelve* months.

KILLALOE.—The wettest February in 24 years, except in 1848, when 7·76 in. fell, being 1·80 in. more than now.

DOO CASTLE.—Very inclement month, almost constant rain; no frost; S on the last day.

OWENDOON.—Rainfall and floods very high this month, particularly on 7th, 8th, and 9th, when 3·00 in. fell almost within 48 hours; S lay on the 27th (nearly an inch deep) for the first time this season, though it was seen on the mountains on the 12th; a very forward spring.

WARINGSTOWN.—Wet and stormy but mild; spring flowers from a month to five weeks earlier than usual; S on 27th and 28th.

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## THE METEOROLOGICAL SOCIETY.

THE ordinary meeting of this Society was held at the rooms of the Civil Engineers, 25, Great George Street, on Wednesday Evening, the 20th January, James Glaisher, Esq., President, in the chair.

Two Fellows were admitted into the society, and one was elected. An excellent paper by F. W. Doggett, Esq., was read, "On the Weather in connection with the Hop Crops in the year 1868." The paper appeared to have been composed after much personal experience and labour by the author, and pointed to a probable connection between severe blights and the non-prevalence of thunder and lightning at the time of the perfecting of the hops. The fly, and its young in the form of a louse, were described as differing from that which produces the ordinary *black* blight (the *aphis*) in size, colour, and activity, and in producing a *brown* blight (called by continental hop-growers "copper-burnt.") The communication led to a discussion respecting the prevalence of different kinds of vermin with different temperatures. Mr. Glaisher remarked that the ordinary white butterfly, while it could thrive in temperatures as high as 80° forsook the inland counties for the coast when the temperature rose to 90° and more, as it did in the past summer.

A valuable communication by Mr. Pastorelli, on the "Graduation of Spirit Minimum Thermometers," offered an opportunity for some remarks on the great improvements lately effected in these instruments. Then followed a good paper by the Rev. W. Pravita on "Reducing Barometer Readings to the sea level;" but being purely a mathematical work, it will be better read in the Society's *Proceedings* than in this review. Some observations on the Sombrero Hurricane of October, 1867, by R. H. Twigg, Esq., C.E., were read, and these were followed by a brief paper from the President on the Meteorology

of 1868. In July the extraordinary shade temperature of 96°·6 was registered at Greenwich, which, when compared with the minimum of 22°·8 noted in January, gives a range of 73°·8 for the year. The unusual rainfall and warmth of December last were dwelt on at considerable length. Mr. Glaisher was requested, before the close of the meeting, to present the Society with a still more detailed paper on the subject for future publication.

The meeting closed at about 9 p.m. in the usual manner.

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THE ordinary meeting for February was held at 7 p.m. on Wednesday, the 17th, in the rooms of the Institute of Civil Engineers. James Glaisher, Esq., F.R.S., President, in the chair. Five gentlemen were balloted for and elected Fellows of the Society, and three others were "admitted" in the usual form. Two papers were read at this meeting; the first by C. O. F. Cator, Esq., of Parkside, Beckenham on a "Description of Mr. Cator's Anemometer, as newly arranged with the spiral apparatus, and its registrations from September 11th, 1868, to February 11th, 1869." After detailing the changes and improvements which he had effected in his instrument, the author went on to speak at length on the stormy periods through which we have passed since the beginning of October last. It would be utterly impossible to give even a sketch of the peculiarities which he pointed out, but they will be printed in detail in the Society's *Proceedings*. Both the grouping of the gales into "storm," and the lighter winds into "calm-periods," were very interesting, and the value of constant records such as that described is becoming daily more and more recognized. A discussion took place respecting the nature of a peculiar storm which visited the S. of England on February 12th, and this was followed incidentally by some argument as to the conversion of wind-pressure values into equivalents of velocity, without, however, any very valuable result. The question is an old one, but one which deserves far more attention than it has hitherto received.

A second paper, which promises to be of great value, was read by C. Meldrum, Esq., of Mauritius, "On the connection between the rotation of the wind in the South Indian Ocean and the relative positions of the Polar and Equatorial Currents." The paper is but a tithe of a vast amount of work to which the author has devoted both time and means, respecting the weather of the Indian Ocean—especially in connection with the so-called "Mauritius Hurricanes." This paper will be printed, as usual, by the Meteorological Society.